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2 October 1957

MEMORANDUM FOR: Special Assistant to the Director for Planning

SUBJECT: Estimate of Soviet Bloc High Altitude Interception Capabilities

REFERENCE: T.S. 158851, dated 25 February 1957

1. Our previous estimate on this subject was presented in the referenced memorandum. It is our intention in the present paper to deal primarily with significant differences in estimates made now as opposed to the early 1957 date of the earlier estimate.

Early Warning Detection and Tracking

2. As a result of evidence accumulated primarily during 1957, we have broadened the areas of the USSR in which we feel virtually certain that early warning detection and tracking will be accomplished. Geographically, we estimate as follows for various regions of the USSR:

- a. Certain detection and tracking everywhere in the USSR and European satellites west of the Urals and the Caspian.
- b. Almost certain detection and tracking in the Soviet Far East and Eastern Communist China.
- c. Almost certain detection in the northern USSR except between Novya Zemlya and Wrangel Island where we believe that detection would be uncertain. However, we believe that detection in the Tiksi area would be highly likely.
- d. In the southern USSR east of the Caspian to Tashkent, we would expect detection to occur without exception, but east of Tashkent to the region of about Chita, we believe that detection capabilities are

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3. We have not changed our views on Soviet tracking capability in the area west of Urals and Caspian or in the Soviet Far East. We believe more strongly than before that anywhere in the USSR in the areas which the U.S. would designate as target areas Soviet ability to track intruding aircraft will be high.

4. In two areas tracking capabilities appear to be relatively low and worth mentioning. One of these is the region bounded on the west by the Aral Sea, on the east by Semipalatinsk, and on the north by the Trans-Siberian railroad. Our assessment in this case is based on radar density and reaction to overflight. The other area, about which we have almost no information, lies east of the Urals between the Trans-Siberian railroad and the Arctic coastal strip. The former of these areas may not long remain relatively free of radar but the latter, being largely devoid of critical military installations, may remain relatively free for some time.

Electronic Aspects of Ground Control Intercept (GCI)

5. Our previous estimate that the Soviets are fully capable of GCI was to some extent strengthened as a result of 1957 activities. Soviet height finding capabilities appear much improved in many areas of the USSR with the introduction of ROCK CAKE height finding radars fairly widely throughout the areas covered. We believe there is no longer any reason for the Soviets not to know the altitudes at which Project operations have been conducted. We continue to believe that the Soviets have adequate airborne intercept (AI) radar for use in interception vehicles.

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Interceptor Aircraft and Air-to-Air Missiles

6. As in the previous estimate, we have ruled out the possibility that rocket boosted or high altitude research aircraft might represent a threat.

7. Considering that the Soviets in July 1956 were given firm warning of what to expect and found themselves at that time unable to cope with the situation, we believe it highly likely that they would begin to modify one or more types of interceptors to obtain one with increased altitude capability. We have noted for some time Soviet interest in high altitude flights (up to 60-65,000 feet) by military aircraft though no evidence points to a specific modification program. Combat ceiling capabilities of four advanced Soviet interceptors are as follows: MIG-17 - 59,000 ft.; MIG-19 - 61,000 ft.; FACEPLATE - 61,000 ft.; FITTER - 60,000 ft. Using the MIG-19, for example, in about a year delivery of a modified version able to reach a combat ceiling of 68-70,000 feet would be possible. Thus, with July 1956 as a starting date, delivery of such aircraft would be expected to begin as early as July 1957. We believe that the threat from such modified aircraft using simple armament is increasing rapidly in critical areas of the USSR and throughout 1958 will represent the principal physical hazard to operations. We emphasize, however, that this capability is little more than marginal and, bearing in mind the AI and GCI problems, luck will have to be on the side of the Soviets to carry out an interception by this means.

8. As lesser possibilities, we have considered (a) use of MIG-17 or MIG-19 aircraft at 55-60,000 feet as vehicles for launching air-to-air missiles from a "pull up" altitude; (b) use of supersonic interceptors "zoomed" to

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70,000 feet or more, also for AA missile attack and (c) use of nuclear warheads in air-to-air rockets. By the "pull up" technique, missiles might be launched so as to intercept targets up to about 68,000 feet using stockpile missiles or much higher using specially designed missiles. Primarily because of the complexities of the GCI, AI and missile guidance problems involved in such an attack, however, we believe kill probabilities would be low <sup>but not negligible</sup> during 1958. The "zoom" technique likewise has many inherent difficulties and its use involves at best a marginal threat. The technique involves essentially accelerating a supersonic interceptor, such as FACEPLATE or FITTER, to maximum speed at combat ceiling of about <sup>60</sup>55,000 feet and in an energy climb going to altitudes of probably 70,000 feet or more. Despite the fact that the aircraft is committed and is capable of little or no change in direction once it begins its energy climb, it is nevertheless a vehicle with some capability for launching missiles or unguided rockets. Techniques for this purpose are difficult, but not impossible, to master. For several reasons we consider use of air-to-air rockets with nuclear warheads, though possibly effective, to be unlikely. Internal political considerations would render their use unlikely over populated areas, but they could conceivably be effective over such targets as Kapustin Yar or other test ranges. We have no information of such Soviet development but it is within their capability although protection of the pilot for such a high altitude attack might be difficult. We have discussed these possibilities primarily because we believe that Soviet desire to accomplish interception might cause them to attempt even marginal methods such as these.

9. Summarizing the various possible hazards from aircraft and AA missiles, we believe that time is running out for operations at 70,000 feet or less, and possibly somewhat above this level. A gradual stiffening of defenses, first around the key targets, can be expected from now on. We likewise believe that we can expect to see Soviet aircraft operating at or

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near the altitudes employed by the Project vehicle. We believe, however, that the chance of successful Soviet interception is low and will continue to be so throughout 1958.

Surface-to-Air Missiles

10. As we pointed out previously, we believe that the Soviets would find it difficult to operate the present Moscow surface-to-air missile at 70,000 feet and above, and we do not believe such missiles will pose a serious threat to operations before the middle or close of 1958.

11. Beginning with 1959, however, we believe the Soviets will introduce a SAM missile with considerably increased altitude and range capabilities. This missile will appear first in the Moscow region where an extensive SAM launching complex of about 60 sites exists now and possibly also around Leningrad where similar launching facilities are under construction. We note also that one such site exists at Kapustin Yar though any hazard from it can be eliminated by proper selection of flight course. Advanced SAM systems are probably now under development at Kapustin Yar and in 1958 might have some capability against project aircraft.

Areas of Special Consideration

12. We continue to believe that in the environs of Moscow the Soviets would employ the most advanced techniques of which they are capable and, accordingly, we consider this to be the most hazardous area for operations. It is particularly true of this area that the chances of successful operation increase with increase in altitude.

13. We believe that the region east of Stalingrad (Kapustin Yar - Vladimirovka), where we know that missile development of many types is conducted and which is adjacent to experimental aircraft testing

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intercept capabilities are high. No other areas, with the possible exception of Leningrad, are known to rank with these two.

Concluding Remarks

14. In summary, we believe that:

- a. detection and tracking of the vehicle are virtually assured.
- b. specially designed aircraft capable of operating at or near 70,000 feet are now, or shortly will be, available to the Soviets in limited numbers. These aircraft could possibly conduct successful interception at or near 70,000 feet.
- c. the combination of Soviet interceptors and <sup>air to air</sup> AA missiles now poses a small but growing threat around a few highly sensitive target areas.
- d. SAM missiles, now deployed around Moscow and possibly Leningrad, ~~during 1958~~ <sup>up to early 1958 but</sup> will have a low kill capability versus the Project vehicle. ~~this capability will increase markedly.~~ <sup>and could become serious by 1959</sup>
- e. by mid-1958 many of our highest priority targets will have to be considered defended areas against operations conducted below 70,000 feet.

15. We suggest that operational planning take into account the change in the picture which we have outlined above. It appears that some sacrifice of "take" may be necessary to preserve the operation. It may become necessary to make more frequent changes in course in order to throw off

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interception. More careful selection of routes to and from target areas may also be required. We believe some such changes will be necessary if chances of interception over our most desired targets are to be minimized.

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